ANNUAL REPORT

OF

THE DIRECTOR

OF THE

MUSEUM OF COMPARATIVE ZOÖLOGY

AT HARVARD COLLEGE

TO THE

PRESIDENT AND FELLOWS OF HARVARD COLLEGE

FOR

1917-1918.

CAMBRIDGE, U. S. A.:
PRINTED FOR THE MUSEUM.
1918.

REPORTS ON THE SCIENTIFIC RESULTS OF THE EXPEDITION TO THE EASTERN TROPICAL PACIFIC, IN CHARGE OF ALEXANDER AGASSIZ, BY THE U. S. FISH COMMISSION STEAMER "ALBATROSS," FROM OCTOBER, 1904, TO MARCH, 1905, LIEUTENANT COMMANDER L. M. GARRETT, U. S. N., COMMANDING, PUBLISHED OR IN PREPARATION: —

A. AGASSIZ. V.[5] General Report on the Expedition.
A. AGASSIZ. I.[1] Three Letters to Geo. M. Bowers, U. S. Fish Com.
H. B. BIGELOW. XVI.[16] The Medusae.
H. B. BIGELOW. XXIII.[23] The Siphonophores.
H. B. BIGELOW. XXVI.[26] The Ctenophores.
R. P. BIGELOW. The Stomatopods.
O. CARLGREN. The Actinaria.
R. V. CHAMBERLIN. The Annelids.
H. L. CLARK. The Holothurians.
H. L. CLARK. The Starfishes.
H. L. CLARK. XXX.[30] The Ophiurans.
S. F. CLARKE. VIII.[8] The Hydroids.
W. R. COE. The Nemerteans.
L. J. COLE. XIX.[19] The Pycnogonida.
W. H. DALL. XIV.[14] The Mollusks.
C. R. EASTMAN. VII.[7] The Sharks' Teeth.
S. GARMAN. XII.[12] The Reptiles.
H. J. HANSEN. The Cirripeds.
H. J. HANSEN. XXVII.[27] The Schizopods.
S. HENSHAW. The Insects.
W. E. HOYLE. The Cephalopods.
W. C. KENDALL and L. RADCLIFFE. XXV.[25] The Fishes.
C. A. KOFOID. III.[3] IX.[9] XX.[20] The Protozoa.
C. A. KOFOID and J. R. MICHENER. XXII.[22] The Protozoa.
C. A. KOFOID and E. J. RIGDEN. XXIV.[24] The Protozoa.
P. KRUMBACH. The Sagittae.
R. VON LENDENFELD. XXI.[21] The Siliceous Sponges.
R. VON LENDENFELD. XXIX.[29] Hexactinellida.
G. W. MÜLLER. The Ostracods.
JOHN MURRAY and G. V. LEE. XVII.[17] The Bottom Specimens.
MARY J. RATHBUN. X.[10] The Crustacea Decapoda.
HARRIET RICHARDSON. II.[2] The Isopods.
W. E. RITTER. IV.[4] The Tunicates.
B. L. ROBINSON. The Plants.
G. O. SARS. The Copepods.
F. E. SCHULZE. XI.[11] The Xenophyophoras.
HARRIET R. SEARLE. XXVIII.[28] Isopods.
H. R. SIMROTH. Pteropods, Heteropods.
E. C. STARKS. XIII.[13] Atelaxia.
TH. STUDER. The Alcyonaria.
JH. THIELE. XV.[15] Bathysciadium.
T. W. VAUGHAN. VI.[6] The Corals.
R. WOLTERECK. XVIII.[18] The Amphipods.

[1] Bull. M. C. Z., Vol. XLVI., No. 4, April, 1905, 22 pp.
[2] Bull. M. C. Z., Vol. XLVI., No. 6, July, 1905, 4 pp., 1 pl.
[3] Bull. M. C. Z., Vol. XLVI., No. 9, September, 1905, 5 pp., 1 pl.
[4] Bull. M. C. Z., Vol. XLVI., No. 13, January, 1906, 22 pp., 3 pls.
[5] Mem. M. C. Z., Vol. XXXIII., January, 1906, 90 pp., 96 pls.
[6] Bull. M. C. Z., Vol. L., No. 3, August, 1906, 14 pp., 10 pls.
[7] Bull. M. C. Z., Vol. L., No. 4, November, 1906, 26 pp., 4 pls.
[8] Mem. M. C. Z., Vol. XXXV., No. 1, February, 1907, 20 pp., 15 pls.
[9] Bull. M. C. Z., Vol. L., No. 6, February, 1907, 48 pp., 18 pls.
[10] Mem. M. C. Z., Vol. XXXV, No. 2, August, 1907, 56 pp., 9 pls.
[11] Bull. M. C. Z., Vol. LI., No. 6, November, 1907, 22 pp., 1 pl.
[12] Bull. M. C. Z., Vol. LII., No. 1, June, 1908, 14 pp., 1 pl.
[13] Bull. M. C. Z., Vol. LII., No. 2, July, 1908, 8 pp., 5 pls.
[14] Bull. M. C. Z., Vol. XLIII., No. 6, October, 1908, 285 pp., 22 pls.
[15] Bull. M. C. Z., Vol. LII., No. 5, October, 1908, 11 pp., 2 pls.
[16] Mem. M. C. Z., Vol. XXXVII., February, 1909, 243 pp., 48 pls.
[17] Mem. M. C. Z., Vol. XXXVIII., No. 1, June, 1909, 172 pp., 5 pls., 3 maps.
[18] Bull. M. C. Z., Vol. LII., No. 9, June, 1909, 26 pp., 8 pls.
[19] Bull. M. C. Z., Vol. LII., No. 11, August, 1909, 10 pp., 3 pls.
[20] Bull. M. C. Z., Vol. LII., No. 13, September, 1909, 48 pp., 4 pls.
[21] Mem. M. C. Z., Vol. XLI., August, September, 1910, 323 pp., 56 pls.
[22] Bull. M. C. Z., Vol. LIV., No. 7, August, 1911, 38 pp.
[23] Mem. M. C. Z., Vol. XXXVIII., No. 2, December, 1911, 232 pp., 32 pls.
[24] Bull. M. C. Z., Vol. LIV., No. 10, February, 1912, 16 pp., 2 pls.
[25] Mem. M. C. Z., Vol. XXXV., No. 3, April, 1912, 98 pp., 8 pls.
[26] Bull. M. C. Z., Vol. LIV., No. 12, April, 1912, 38 pp., 2 pls.
[27] Mem. M. C. Z., Vol. XXXV., No. 4, July, 1912, 124 pp., 12 pls.
[28] Bull. M. C. Z., Vol. LVIII., No. 8, August, 1914, 14 pp.
[29] Mem. M. C. Z., Vol. XLII., June, 1915, 397 pp., 109 pls.
[30] Bull. M. C. Z., Vol. LXI., October, 1917, 28 pp., 5 pls.

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MUSEUM OF COMPARATIVE ZOÖLOGY.

Faculty.

ABBOTT LAWRENCE LOWELL, *President.*

HENRY P. WALCOTT. GEORGE L. GOODALE
SAMUEL HENSHAW, *Director.* JOHN E. THAYER.

Committee on the Museum.

HENRY P. WALCOTT. GEORGE L. GOODALE.

Officers.

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WALTER FAXON . . . . . *Curator of Crustacea and Mollusca.*
SAMUEL GARMAN . . . *Curator of Reptiles, Amphibians, and Fishes.*
WILLIAM BREWSTER . . *Curator of Birds.*
OUTRAM BANGS . . . . . *Curator of Mammals and Associate Curator of Birds.*
HUBERT L. CLARK . . . . *Curator of Echinoderms.*
HENRY B. BIGELOW . . . *Curator of Coelenterates.*
ROBERT W. SAYLES . . . *Curator of the Geological Collections.*
PERCY E. RAYMOND . . *Curator of Invertebrate Palaeontology.*
THOMAS BARBOUR . . . . *Associate Curator of Reptiles and Amphibians.*
RALPH V. CHAMBERLIN . *Curator of Arachnids, Myriopods, and Worms*
JOHN C. PHILLIPS . . . . *Associate Curator of Birds.*
NATHAN BANKS . . . . . *Curator of Insects.*
GEORGE NELSON . . . . . *Preparator.*

REGINALD A. DALY . . . *Sturgis Hooper Professor of Geology.*
EDWARD L. MARK . . . . *Hersey Professor of Anatomy.*
GEORGE H. PARKER . . . *Professor of Zoölogy.*
WILLIAM E. CASTLE . . . *Professor of Zoölogy.*
WILLIAM M. WHEELER . *Professor of Economic Entomology.*
ROBERT DEC. WARD . . . *Professor of Climatology.*
ALEXANDER G. MCADIE . *Professor of Meteorology.*
WALLACE W. ATWOOD . . *Professor of Physiography.*
LOUIS C. GRATON . . . . *Professor of Economic Geology.*
JAY B. WOODWORTH . . . *Associate Professor of Geology.*
PERCY E. RAYMOND . . . *Associate Professor of Palaeontology.*
HERBERT W. RAND . . . *Assistant Professor of Zoölogy.*
CHARLES T. BRUES. . . . *Assistant Professor of Economic Entomology.*

REPORT.

To the President and Fellows of Harvard College:—

During the Academic year 1917–1918, most of the instruction in Zoölogy, Geology, and Geography offered in Harvard University and in Radcliffe College was given in the Laboratories and Lecture Rooms of the Museum.

In Zoölogy sixteen courses and half courses were taken by 263 students in Harvard University and ten courses and half courses were taken by 121 students in Radcliffe College.

In 1916–1917 these courses and students were:—

Harvard:— 19 courses, 410 students.

Radcliffe:— 10 courses, 98 students.

In Geology and Geography eleven courses were given in Harvard University and two courses were given in Radcliffe College.

The number of students taking these courses was 372 in Harvard University and 24 in Radcliffe College.

In 1916–1917 these courses and students were:—

Harvard:— 28 courses, 703 students.

Radcliffe:— 2 courses, 34 students.

In December an imperfection in the sprinkler system caused a water damage to the building and cases. Fortunately, however, the break occurred at an hour when the prompt and energetic work of the Museum force prevented serious injury to the collections.

Though the field-work and most of the activities of the Museum have been curtailed during the year, the Museum has been fortunate in having much voluntary assistance in the care and development of its collections. Especial mention should be made of the work of Mr. T. E. Penard in the Ornithological department; of Mr. E. H. Dunn who has studied and catalogued the entire collection of urodele amphibians; of Mr. G. K. Noble for his study of a large number of reptiles and amphibians from South America; of Mr. H. W. Fowler for his study of a large part of the Indian fishes received in the early seventies from Rev. M. M. Carleton; of Mr. L. W. Swett who has continued the rearrangement of the geometrid moths; of Miss E. B. Bryant for her work on the collection of Araneina; and of Prof. W. H. Twenhofel who has identified and labeled the Ordovician and Silurian fossils collected during the 1914 expedition to the Baltic.

From the Hon. W. Cameron Forbes the Museum has received an immense series of Philippine shells. Governor Forbes's gift contains many species of great beauty and rarity new to the collection, but its principal value to the Museum consists in its bulk, a million specimens is a very conservative estimate, which in many cases affords unequalled material for studies in variation.

Considerable series of invertebrate fossils, shells, insects, fishes, and birds have been received from the Boston Society of Natural History according to the plan of coöperation agreed upon in 1914. The Museum's return consists of a series of New England shells and a few representative species selected by the Curator of the Society for its general collection. The Museum's Preparators also serve the Society upon request.

The Museum is indebted to Prof. W. M. Wheeler for series of ants, and other insects and of arachnids; to Mr. E. D. Harris for very many Cicindelidae; to Mr. F. C. Bowditch for additional Chrysomelidae; to Mr. B. P. Clark for a number of hawk moths; to Mr. A. H. Clark for an exhibition series of Lepidoptera (Denton mounts); to Mr. C. P. Wilson for an especially large Alligator Gar; to Mr. G. R. Agassiz for a Tarpon; to Mr. Daniel Vincent for two valuable vertebrate fossils from Gay Head, and to Mr. H. K. Balch for the heads of Moose from northern Minnesota.

The death of the Rev. Henry W. Winkley at Danvers on 4 February, 1918, is recorded with regret. In June, 1906, the Museum received Mr. Winkley's large and valuable series of land shells collected in many parts of the world with the exception of New England. Since that date Mr. Winkley had shown a deep interest in the Museum collection of Mollusca and had contributed to it many specimens of value. Miss Ruth Winkley, in accordance with the wishes of her father, has given to the Museum his collection of New England shells, a collection well identified and labeled, and especially rich in minute and closely allied species.

The death of Mr. Goodwin Warner is also recorded with regret. Recently, and on more than one occasion, Mr. Warner aided most effectively in field-work carried on by the Museum. Mr. Warner at the time of his death, which occurred in France, 29 June, 1918, of pneumonia, was second lieutenant American Expeditionary Forces.

Work upon the collection of mammals has been continued by Dr. G. M. Allen, who has identified and catalogued recent accessions and made excellent progress in incorporating much of the fossil material with the osteological series. This work is complete

for the proboscideans and palaeotheres. The accession most worthy of note is several specimens of *Capromys nana* a small Cuban rodent. This species first described in March, 1917, was based on some fragments of jaws found in cave-deposits in a subfossil condition. The living individuals were secured by or through the aid of Dr. Thomas Barbour.

Mr. Bangs's constant work upon the collection of birds keeps pace with the growth and development of the same. Throughout the year, Mr. Bangs has enjoyed the coöperation of Mr. T. E. Penard to whom the Museum is also indebted for several types of Surinam birds. The notable accessions include series from the Cameroons and Hawaii, (purchased), New Guinea and Cuba, (gift of Dr. Thomas Barbour), and Surinam, (gift of Mr. F. F. Jonesberg).

About six months of the Museum year were spent by Dr. Thomas Barbour in Cuba, during which time the interests of the Museum were advanced when not inconsistent with the duties which occasioned his stay in Cuba. Among the more important accessions to the collections of reptiles and amphibians, Dr. Barbour mentions a series of venomous snakes of Brazil, (gift of Dr. Vitel Brazil), amphibians from Central Peru, (gift of Mr. J. M. Boutwell), and Cuban reptiles, (gift of Mr. C. T. Ramsden).

Mr. Garman's work upon the fishes, owing to the extent of the year's accessions, has been almost wholly curatorial. These accessions include, among others, collections from North America, (F. W. Putnam), Japan, (E. S. Morse), Hawaii, (C. F. Winslow), Cuba, (F. Poey), and the embryos, dissections, and skeletons, the basis of many of the classic memoirs of Dr. Jeffries Wyman. All the above were received from the Boston Society of Natural History. Collections from Michigan, (gift of Prof. Jacob Reighard), Bermuda (gift of Dr. E. L. Mark), and Cuba, (gift of Dr. Thomas Barbour), are also noteworthy. Mr. Alvin Seale, as a temporary Assistant, has worked throughout the year upon the clupeoid fishes. He has studied not only the extensive series in this Museum but also the collections of the University of California, Leland Stanford Junior University, U. S. National Museum, Academy of Natural Sciences of Philadelphia, and the American Museum of Natural History; the officials of these museums most courteously gave Mr. Seale every facility for his work, a work which has enabled him to examine most of the types extant in the United States. Mr. Seale effected some interchanges of specimens advantageous to the collection of the Museum.

Large accessions have been made to the Entomological collections by gift, exchange, and by the field-work of the Curator. Mr. Banks's duties also involve assistance to the many students who consult the collection. Aside from his curatorial service, Mr. Banks has prepared papers on the termites (white ants) of the United States, of Panama, and of the West Indies. His taxonomic work also includes descriptions of new Hymenoptera, Diptera, and Neuroptera. As a recognized authority upon the Arachnida, Mr. Banks not infrequently receives collections of this class of which he has not official charge, and reports upon the same.

Though Dr. Chamberlin as Curator of the myriopods, arachnids, and worms gave a part of his year's work to each of these groups, by far the larger portion of the time was given over to a study of the chilopods and diplopods of the West Indies and the islands of the Pacific, a study which has added the types of more than 300 new species to the collection. Dr. Chamberlin has also worked over and prepared a report upon the Pacific Coast annelids collected by Mr. Agassiz in 1859–1860. Several collections of arachnids and worms have been received for study and report, duplicates from which will be retained by the Museum.

Mr. W. F. Clapp has identified, labeled, and catalogued the very considerable accessions to the collection of Mollusca; these with few exceptions are distributed systematically. The Pelecypoda, exclusive of the Unionidae, have been rearranged, a work which makes the entire collection readily available. Governor Forbes's Philippine shells and the Winkley collection have been already mentioned; other important accessions include a large series of Unionidae from the Boston Society of Natural History, one hundred and twenty-six species, nearly all new to the Museum, from the University of Colorado, and many Cuban land shells from Dr. Thomas Barbour.

Dr. H. L. Clark states that more than 1,000 specimens have been added to the collection of echinoderms during the year, all of which have been identified, labeled, and catalogued. He has prepared reports, complete or partly so, upon the echinoderms of South African waters and upon the holothurians and sea-stars collected during the ALBATROSS expeditions to the Tropical Pacific.

Dr. H. B. Bigelow's services for the government of the United States gave him very little time for his Museum duties as Curator of Coelenterates. He has cared for the accessions received and studied the medusan collections and data to be used for reports

on the Canadian Arctic expedition of 1913–1915 and during the cruise of the GRAMPUS in 1916.

Prof. P. E. Raymond, Curator of Invertebrate Palaeontology, as Associate Professor of Palaeontology, gives somewhat more than half of his time to the instruction of students in Harvard University. His field-work in both capacities and the work of his advanced students accrues very largely to the advantage of the collections of the Museum. During the year, Professor Raymond collected in the Ordovician and Devonian strata of Iowa, and in the Ordovician of southwestern Virginia and eastern Tennessee. From his recent collectings, Professor Raymond has secured and described a large number of new species of trilobites. He has also identified and labeled a number of trilobites belonging to several families, and has determined several collections of fossils sent for that purpose by the Geological Survey of Canada, and by Yale University. The accessions include a large series of fossils from many localities and formations, from the Boston Society of Natural History, a considerable series of corals and mollusks from the Fiji Islands, from Prof. W. G. Foye, and many fine specimens from Mr. J. R. Bradley, Jr., and Mr. A. G. Becker.

Mr. R. W. Sayles, Curator of the Geological collections, spent most of his time in the preparation of a memoir entitled Seasonal deposition in aqueo-glacial sediments. Toward the publication of this memoir Mr. Sayles has generously contributed the illustrations. The only addition of importance received during the year consists of twenty-seven specimens received in exchange from the Boston Society of Natural History. A recent census of the collection gives a total of 5,850 specimens, 3,615 illustrative of dynamical and structural geology, and 2,235 specimens of economic geology.

Though the employment of a Preparator in a large museum offers little opportunity for detailed report, it consists of an endless mass of varied work, at times requiring the most skilful workmanship, and at times entailing the most monotonous drudgery. Mr. George Nelson, during the year, has mounted for exhibition vertebrates of every class, has repaired and mounted skeletons of the same, made skins of mammals and birds from fresh material, and repaired and made over old specimens of the same, and has made casts of a considerable series of unique fossil vertebrates. Mr. Nelson has also made some elaborate colored drawings and his excellent photographic work has been utilized for the illustration of Museum publications and not infrequently for the benefit of other institutions and investigators. Mr. A. B. Fuller's

time has been given over chiefly to the improvement of the research collections of mammals and birds; he has made over in a most satisfactory manner a very large number of skins. For exhibition, Mr. Fuller has mounted the young Bison received last year from Dr. W. L. Smith and for the New England collection of the Boston Society of Natural History, he has remounted the Whooping Crane killed in the summer of 1908 in Connecticut.

The Library contains 55,184 volumes and 55,808 pamphlets; 757 volumes and 3,309 pamphlets have been added during the year; these figures are according to the principle that every printed publication of one hundred pages is recorded as a volume, one of less than one hundred pages as a pamphlet.

The publications of the year include two parts of volume 43 of the Memoirs, fourteen numbers of the Bulletin and the Annual Report, a total of 787 (208 quarto and 579 octavo) pages, illustrated by 66 (38 quarto and 28 octavo) plates. Volume 43 of the Memoirs, a review of the American characins by Prof. C. H. Eigenmann, will be completed in five parts with 101 plates. This Memoir is based largely upon the immense collection obtained by the Nathaniel Thayer expedition to Brazil. The plates are printed and the parts will be issued as rapidly as the interests of the Museum as a whole will allow. Eight numbers of the Bulletin contain reports on Museum collections, and three numbers published as Contributions from the Bussey Institution are based, wholly or in part, upon Museum collections; one number contains an account of the ophiurans collected during two of the ALBATROSS expeditions to the Pacific carried on under the direction of Mr. Agassiz; one number contains the seventh annual report of the Harvard Seismographic Station, and another a detailed illustrated description of the Harvard deep-sea thermograph, an ingenious instrument working satisfactorily in waters of moderate depth, though as yet not tested in deep water. The eighty plates for Dr. Chamberlin's memoir on the ALBATROSS Pacific polychaete annelids have been printed. Professor Verrill's report on the BLAKE alcyonarians will be illustrated by 140 plates, and this series of plates has been completed during the year as have those for two memoirs, one (10 plates), on the ALBATROSS Dolabellinae, and one (14 plates), on the Atlantic Solenogastres.

Toward the publication of the Report of the Seismographic Station, the Corporation granted $200.

SAMUEL HENSHAW,
Director.

REPORT ON THE ZOÖLOGICAL LABORATORY.

By E. L. Mark.

The courses in Zoölogy offered for the year 1917–1918 were, with the exception of those given in alternate years, the same as in 1916–1917, and were conducted by the same instructors; but the opportunity for laboratory work in Zoölogy 8 was withdrawn. As in the previous year, and to a greater extent, the numbers in courses were affected by the war, the total number of registrations in Harvard being about thirty per cent less than in 1916–1917.

Tables I and II give the statistics regarding each of the courses in Harvard and in Radcliffe College, respectively.

TABLE I.

Courses 1917-1918	Graduates A. & S.	Graduates Ap. S.	Sen.	Jun.	Soph.	Fresh.	Uncl.	OCC.	Sp.	Med. Trop.	Bussey Instn.	Total
Zoölogy 1	3	—	18	20	28	41	—	—	1	1	—	112
" 3	4+*4*	0+*1*	5	8	15	7	3	1	2	—	—	45+*5*
" 4	1	0+*1*	4	1	1	1	—	—	—	—	—	8+*1*
" 5*b*	4+*1*	—	1	1	1	1	1	—	—	—	—	9+*1*
" 7*a*	1	—	—	1	2	—	—	—	—	—	—	4
" 7*c*	1	—	—	—	1	—	—	—	—	—	—	2
" 8	6	—	7	7	7	—	3	1	—	—	—	31
" 12	6+*2*	—	—	—	—	—	—	—	—	—	—	6+*2*
" 14*a*	5+*1*	—	5+*1*	0	1	1	—	1	—	—	0+*1*	13+*3*
" 17	5	0+*1*	1	—	—	—	—	—	—	—	—	6+*1*
" 20*a*	3	—	—	—	—	—	—	—	—	—	—	3
" 20*b*	1	—	—	—	—	—	—	—	—	—	—	1
" 20*c*	2	—	—	—	—	—	—	—	—	—	1	3
" 20*e*	4	—	—	—	—	—	—	—	—	—	—	4
" 20*f*	1	—	1	—	—	—	—	—	—	—	—	2
" 20*g*	1	—	1	—	—	—	—	—	—	—	—	2
Sums	48+*8*	0+*3*	43+*1*	38	56	51	7	3	3	1	1+*1*	251+*13*

Note: Numbers in italics indicate students who attended the lectures, but were not enrolled in the course.

TABLE II

Courses 1917-1918	Grad.	Sen.	Jun.	Soph.	Fresh.	Uncl.	Sp.	Total
Zoölogy 1	2	4	6	16	7	3	1	39
" 2	—	8	15	19	—	4	2	48
" 3	3	1	3	1	1	—	1	10
" 4	2	1	1	—	—	1	1	6
" 5*b*	2	—	1	—	—	1	—	4
" 7*a*	—	5	2	—	—	—	—	7
" 14*a*	—	2	1	—	—	—	—	3
" 17	—	2	—	—	—	—	—	2
" 20*c*	1	—	—	—	—	—	—	1
" 20*g*	—	1	—	—	—	—	—	1
Sums	10	24	29	36	8	9	5	121

The assistants in courses were as follows: — Zoölogy 1, *Harvard:* chief-assistant, Mr. J. P. Baumberger, sub-assistants, Dr. A. J. Bigney, and Messrs. A. W. L. Bray, V. Obreshkove, C. S. Simkins, and G. K. Noble; *Radcliffe:* chief-assistant, Mr. A. C. Kinsey, sub-assistant, Mr. R. J. Dobson. Zoölogy 3, *Harvard:* chief-assistants, Messrs. J. M. D. Olmsted (for two weeks), and R. J. Dobson, sub-assistant, Dr. A. J. Bigney; *Radcliffe:* assistants, Messrs. R. J. Dobson and V. Obreshkove. Zoölogy 4, *Harvard:* assistants, Messrs. A. C. Walton (for four weeks) and A. B. Dawson; *Radcliffe:* assistant, Mr. A. B. Dawson. Zoölogy 5b, *Harvard* and *Radcliffe:* assistant, Mr. A. W. L. Bray. Zoölogy 12, *Harvard:* assistants, Messrs. A. C. Walton (for four weeks) and A. W. L. Bray.

Courses 7a, 7c and 20f were given at the Bussey Institution, the others in Cambridge. Of the twelve Harvard students enrolled in Zoölogy 14a, six pursued it with laboratory work, the others as a thesis course. Of the former, one prepared a paper which has been published in the Contributions from the Laboratory. One of the three Radcliffe students took the course with laboratory work. All the Harvard students enrolled in Zoölogy 17 took the course with laboratory work; of the two in Radcliffe College, one elected to take laboratory work, the other thesis work.

The University Extension Course in Elementary Zoölogy — fifteen exercises on the comparative anatomy of selected groups of animals — was given as usual by Professor Parker, during the

first half-year. Seventeen persons were in attendance. The laboratory assistant was Mr. J. P. Baumberger.

Research work was counted as equivalent to courses as follows:— in Harvard, Zoölogy 20a and 20b, under Professor Mark, five courses; Zoölogy 20c, under Professor Parker, three and three fourths courses; Zoölogy 20e and 20g, under Assistant Professor Rand, five and one fourth courses; Zoölogy 20f, under Professor Wheeler and Assistant Professor Brues, four and one half courses; in Radcliffe, Zoölogy 20c, under Professor Parker, one course; Zoölogy 20g, under Assistant Professor Rand, one half course.

The degree of Ph.D. was conferred in June on Alden Benjamin Dawson, his thesis being entitled The integument of *Necturus maculosus* Rafinesque.

Opportunities for war service prevented students who had planned to spend a portion of the summer at the Bermuda Biological Station from going there, so that the Resident Naturalist, Dr. Crozier, and his family were the only occupants.

The Harvard Table at the Marine Biological Laboratory, Woods Hole, was occupied by a research student, studying problems in experimental zoölogy, and the Radcliffe Table was shared by an unclassified student taking the course in physiology, and a graduate taking the course in botany.

The Zoölogical Club held twenty-two meetings, at which sixteen original papers and twenty-one reviews were presented.

Lists of the Contributions from the Zoölogical Laboratory and from the Bermuda Biological Station for Research for the year 1917–1918 are given on pp. 30, 31; other papers by members of the Department are listed under the authors' names.

REPORT OF THE DEPARTMENT OF GEOLOGY AND GEOGRAPHY.

By J. B. Woodworth.

Professor Daly acted as Chairman of the Department until February, 1918; he conducted Geology 4 during the first half year with the assistance of Messrs. N. E. A. Hinds and T. H. Clark.

War service for the U. S. government caused the withdrawal or curtailment of many of the usual courses of Professors Daly, Ward, McAdie, Atwood, Graton, Woodworth, and Raymond. Messrs. T. H. Clark, D. H. Hall, and N. E. A. Hinds, Assistants to Professors Daly and Graton, resigned to enter governmental service. The number of students taking the different courses was:—

Harvard:

Geology	4	—	Professor Daly; Messrs. Clark and Hinds	77
"	5	—	Professors Woodworth and Raymond	25
"	10	—	Professor Graton; Mr. Hall	2
"	16	—	" Woodworth	4
Geography	1	—	" Atwood	84
"	6	—	" "	17
Palaeontology	1	—	" Raymond	4
"	20	—	" "	2
Meteorology	1	—	" Ward	112
" (marine)		—	" "	50
				377

Radcliffe:

Geology	4	—	Professor Woodworth	16
"	5	—	" "	8
				24

In Geology 12, one student completed the work of the first half year. The course in Marine meteorology was conducted chiefly for naval students. Several students included in the above enumeration left with full credit for the course because of their enlistment in the army or navy.

The great reduction in the number of students, graduate and undergraduate, allowed several of the staff to conduct instruction

in Reserve Officers' Training Corps in military sketching and map-reading.

Mr. Randolph C. Ray has given efficient service throughout the year as preparator and as assistant in the mechanical work of the Seismographic Station. To facilitate his work, a small room was partitioned off in the hall of the second floor of the Geological Museum.

A few additions have been made to the Gardiner Collection of Photographs; but no significant changes or additions to the equipment of the laboratories were made during the year.

The building was struck by lightning in August, 1918, the bolt entering the motor room and setting fire to gas from a pipe which it burned through. It should be recorded that the brick chimney of the ventilator on the building was broken down by lightning two years ago. It is probable that the copper roof and the large amount of iron piping in the fire-service installed in the building will ordinarily dissipate an electric discharge.

Professor Ward continued his instruction in meteorology at the U. S. Army School of Military Aeronautics at the Massachusetts Institute of Technology until the end of December, when the Ground School for flying cadets was discontinued; the lectures given at this School have been printed. Professor Ward has continued his study of the effects of current weather conditions upon military operations in the war, and has made progress in the preparation of a book on the climatology of the United States.

A new marine barometer, and a new thermometer of the U. S. Navy pattern, were added to the Laboratory equipment for use in Professor Ward's course in Marine meteorology.

Professor Atwood gave a number of lectures at Camp Devens and completed the field-work and manuscript on the Physical Geography of the Camp Devens Region for the U. S. Geological Survey.

He has directed the preparation of the chapter on land forms for a new text-book on geology and geography for use in the national Students' Army Training Corps. He also directed special students in aerial photography and the making of maps based on aeroplane photographs.

Some time was given to the preparation of a report on the Physiography of the San Juan Mountains.

Associate Professor Woodworth continued his office-work on the preparation of a report on the Geology of Cape Cod and the islands of the south coast for the U. S. Geological Survey. A

special report was prepared on the water supply of the district at the request of the U. S. government. As Chairman of the subcommittee on the use of the seismograph in war, much time was given to a project which proved less feasible than the employment of sound waves in locating enemy heavy batteries. The Seismographic Station has been kept in running order during the year, though the issuance of the monthly mimeographed bulletin has been much interfered with and the annual reports for the past two years are yet to be written.

During the summer, Professor Raymond spent seven weeks in southwestern Virginia and eastern Tennessee in continuation of the Shaler Memorial study of the stratigraphy of the Ordovician strata of the Appalachians. This second season's work on the problem has yielded valuable results which justify the compilation of a preliminary report on the progress of the investigation.

Six models of extinct animals, and four books were added to the student palaeontological collection during the year.

REPORT ON THE MAMMALS.

By Outram Bangs.

During the year many interesting additions have been made to the collection, though no large series have been received.

From Señor don José Garcia we received a complete specimen of *Capromys nana*, caught alive. Later Dr. Thomas Barbour secured four specimens. Before this discovery the species had been known only from bones found in caves and was supposed to be extinct.

In exchange there have been received thirty-four skins and skulls of South American rodents and opossums, thirty skins and skulls and ten alcoholic African bats, from the American Museum of Natural History; twenty-three skins and skulls from Arkansas from W. G. Savage; two Porto Rican bats from the United States National Museum.

By purchase we have received 188 skins, skulls or skeletons, from the Cameroons, collected by the Rev. George Schwab; twelve skins of Australian mammals.

Single specimens or small series have been presented by Messrs. H. K. Balch, Thomas Barbour, William Brewster, W. E. Castle, Donald R. Dickey, W. R. Forrest, A. B. Fuller, don José Garcia, E. L. Mark, George Nelson, Roland Thaxter, J. E. Thayer, and David Vincent.

Some additional bats were received from Fiji Island Expedition collected by W. M. Mann and from the Harvard Peruvian Expedition collected by G. K. Noble.

REPORT ON THE BIRDS.

By William Brewster.

The Museum has received 389 bird skins by gift, 271 by purchase, sixty-four by exchange. Thus the total number added within the year scarce exceeds 700, as compared with upwards of 900 in 1916–1917 and about 5,500 in 1915–1916. This numerical falling off is not surprising in times like these, when such material cannot be sought freely.

Dr. Thomas Barbour has given us seventy-one birds, mostly from Australia, New Guinea, and Cuba, among which are representatives of no less than forty-six species or subspecies not hitherto possessed by the Museum; Mr. F. F. Jonesberg, 111, collected in Surinam by A. P. Penard, representing eighty species or subspecies of which four are new to us; Mr. G. K. Noble, 110 New England birds, almost all taken by him in or near Cambridge.

For specimens contributed in smaller series or singly, the Museum is indebted to Miss Mary T. Palmer, and to Messrs. H. B. Bigelow (for a Hutchins's Goose killed at Pea Island, North Carolina, January 1, 1918), G. B. Brainard (for a Prairie Horned Dove having only one wing and apparently never possessed of any other although found running about in a field at Gloucester, Mass., December 24, 1917), William Brewster (for fifty-one birds collected by A. T. Wayne near Charleston, South Carolina), W. B. Cabot, Walter Faxon, W. Cameron Forbes, J. B. Goodwin, J. A. Hagar, F. H. Kennard, F. S. Kingsbury, C. R. Lamb, W. M. Mann, George Nelson, T. E. Penard (for six type specimens of Surinam birds) Bene van Rippen (for twelve birds from Portuguese East Africa), G. A. Stiles, and W. M. Tyler.

Of purchased skins twenty-five came from the Hawaiian Islands and 245 from the Cameroons, the former representing three, the latter thirty-eight, birds new to the Museum.

The specimens obtained by exchange include representatives of about thirty-five species or subspecies not heretofore in the Museum. Most of them were furnished by Dr. L. C. Sanford, Mr.

H. K. Coale, Mr. C. W. Chamberlain, and the Dublin National Museum. In return for some of them, thirty birds have been sent to Mr. Coale, four to Mr. Chamberlain, one to the U. S. National Museum, one to Mr. G. G. Cantwell. A Great Gray Owl, taken in northern Maine (Bangs Collection), has been given to the Boston Society of Natural History.

For scientific study 162 skins have been loaned to Dr. W. E. Clyde Todd, forty-seven to Mr. C. B. Cory, twenty-six to Mr. H. C. Oberholser, five to Mr. Schuyler Matthews, two to Dr. E. W. Nelson.

Mr. Bangs continues to devote himself to the care and development of the bird collection, thereby rendering the Museum disinterested and highly valued service.

REPORT ON THE REPTILES AND AMPHIBIANS.

By Thomas Barbour.

The Associate Curator spent about half of the year in Cuba and the Isle of Pines, and during part of the time had the capable coöperation of Mr. W. S. Brooks.

Mr. E. M. Dunn studied the collection of Amphibia Caudata and prepared for publication an annotated catalogue of the same. Mr. G. K. Noble studied the unidentified South American material.

The gifts have been many. Dr. Vital Brazil has given an almost complete series of the venomous snakes of Brazil; Mr. J. M. Boutwell some rare amphibians from the Andean lakes of central Peru; Mr. C. T. Ramsden specimens from eastern Cuba; Dr. A. G. Ruthven paratypes of new forms; Dr. E. Uhlenhuth desirable urodeles.

The material transferred from the Boston Society of Natural History is of great interest and includes the fine series of Pipa which formed the basis for Wyman's pioneer work on its development and anatomy.

A Yellow Boa (*Epicrates subflavus*) from the U. S. N. M. in exchange, completes the representation of the Jamaican reptile and amphibian fauna, with the exception of *Sphaerodactylus gilvitorques*. Other exchanges have been effected with the U. S. National Museum, the Academy of Natural Sciences, Philadelphia, the American Museum of Natural History and the Zoölogical Museum of the University of Michigan.

The purchase includes a large series of reptiles and amphibians from the Cameroons and a desirable series of amphibians from Louisiana.

REPORT ON THE FISHES.

By Samuel Garman.

Much the larger additions to the collection have been made with a minimum of expense for collecting, manipulation, and preservation, from material contributed by the Boston Society of Natural History, drawn from a considerable portion of the world's surface. Among them are Cuban collections made by Prof. F. Poey, others by Prof. E. S. Morse from Japan, by Prof. F. W. Putnam from numerous localities in North America, by C. F. Winslow from the Hawaiian Islands, and by Dr. Jeffries Wyman, including evidences of his industry for many years in the way of skeletons, dissections, and embryos, mainly from South America. Cuban collections have been received from Dr. Thomas Barbour, and some from the Solomon Islands from Dr. W. M. Mann. A lot of carefully selected Bermudian specimens were received from Prof. E. L. Mark.

Mr. G. K. Noble secured a number of Andean fishes from the stomachs of frogs. Dr. J. Reighard furnished a representation of the lampreys of Michigan. A purchase from Rev. George Schwab contains a large series of species from the Cameroons; others were obtained from Madagascar, taken by Mr. F. R. Wulsin.

The Carleton collections were returned by Dr. H. W. Fowler. Considerable amounts of cataloguing, identification, and labeling have been done.

REPORT ON THE ENTOMOLOGICAL DEPARTMENT.

By Nathan Banks.

For accessions during the past year we are indebted to Messrs. C. P. Alexander, C. F. Baker, F. C. Bowditch, S. E. Cassino, T. D. A. Cockerell, J. H. Emerton, H. R. Hagan, C. W. Johnson, M. D. Jones, W. M. Mann, Herbert Osborn, R. Ottolengui, E. Varas, W. M. Wheeler, and E. B. Williamson.

Exchanges were made with Dr. H. Brauns, Messrs. C. E. Mickel, R. J. Tillyard, and R. T. Webber. Specimens for study were loaned to ten persons. Besides the local entomologists, ten others have visited the collection for comparison and study.

The Curator has examined the collection for pests, and noted only a few cases of infestation. During the year more than ten thousand specimens have been pinned, and many labeled. Much of the winter was spent in preparation of revisions of American termites. Papers were prepared on the termites of the West Indies, of Panama, and of the United States. For this purpose material was borrowed from several Museums and Experiment Stations. Numerous types and paratypes were thus added to our already rich collections of American termites.

Several collections were received for determination. The Canadian Entomological Department sent the Neuroptera and Acari collected on the Canadian Arctic Expedition, the National Museum a small collection of Neuroptera and spiders from China, the Universities of Kansas and of Michigan collections of North American Neuroptera, the American Museum the Neuroptera collected on their Congo Expedition, Pomona College a collection of Acari, and the South Australian Museum a collection of Acari from Norfolk and Lord Howe Island. Several papers have been prepared on these collections.

In the Diptera, various genera of Asilidae have been studied and the new species described; in the Hymenoptera, the Bembecidae have been named and additional Psammocharidae described; in the Neuroptera, unnamed Sialidae, Panorpidae, and Psocidae have been determined or described.

REPORT ON THE MYRIOPODS, ARACHNIDS, AND WORMS.

By Ralph V. Chamberlin.

About two weeks were spent in the field in Millard Co., Utah, where intensive collecting of the arachnids of the desert region and certain isolated mountains was carried out in continuation of previous field-work in the Great Basin region.

Considerable time was devoted to a study of the collections of chilopods and diplopods from the West Indies and the islands of the Pacific, and a report prepared upon the myriopod fauna of each of these regions. This work resulted in the addition of more than three hundred new types. A report was prepared upon the myriopods from Louisiana and Okefenokee Swamp received from Cornell University through Prof. C. R. Crosby; several briefer papers on other collections were also prepared.

Accessions of chilopods and diplopods were received from Messrs. C. R. Crosby, W. J. Crozier, H. F. Dietz, E. O. Essig, H. J. Hart, W. A. Hilton, L. O. Howard, P. Rau, E. R. Sasscer, H. J. Smith, and the Southern Biological Supply Co. through Percy Viasco.

An extensive collection of spiders from southern California made during a series of years by Prof. W. A. Hilton and his students was received during the year. Series of the species are to be retained in return for identification. Several small lots of arachnids, chiefly foreign, were also identified. Spiders were also received from Messrs. Joseph Chamberlin, C. L. Marlatt, Joseph Robinson, and Miss Edith Jamieson.

Work on the annelids included the identification of material taken by Mr. Alexander Agassiz on the Pacific Coast in 1859–1860 and of an extensive and highly interesting collection made by Prof. W. A. Hilton on the California coast at and near Laguna Beach. Professor Hilton has kindly consented that the types of the more than forty new species shall be retained by the Museum. Several smaller collections were also identified and catalogued.

Through the agency of Mr. F. Johansen, the Museum received from the Canadian Geological Survey the annelids secured by the Canadian Arctic Expedition for study and report. In return for

this work the Museum is to retain the first set of duplicates. In addition the other Arctic and Subarctic annelids in the collections of the Geological Survey have been received on similar terms. The gephyreans of the Canadian Expedition have been received for study from the U. S. National Museum.

Prof. A. L. Treadwell spent a few days at the Museum in an examination of the West Indian material.

REPORT ON THE ECHINODERMS.

By Hubert Lyman Clark.

The curatorial work has consisted in the rearrangement, accompanied by relabeling, of certain large genera, additional material of which has made a revision practicable. The identification, labeling, and cataloguing of the accessions has kept pace with their receipt.

More than 1,000 specimens were added during the year, including representatives of fifty-six species previously lacking. The most notable accession was a series of nearly 500 specimens received from the South African Museum, Cape Town, in return for the identification of material; this series included forty-eight species and eleven genera new to the collection, with paratypes of twenty-three new species. Other lots received in return for the identification of material were a series of 141 crinoids and Echini, including four genera new to the collection, from the vicinity of the Straits of Florida, presented by the University of Iowa, through Prof. C. C. Nutting; 135 specimens from the Bermuda Biological Station, presented by Prof. E. L. Mark; and eighty-eight specimens from the Labrador and New England coast, presented by the Boston Society of Natural History. A very valuable collection of fifty-seven specimens from the Falkland Islands was generously given by Dr. Richard H. Wace. A small but valuable collection from Samoa was the gift of Mr. John W. Mills. From the estate of the late Rev. H. W. Winkley, forty-nine specimens from the New England coast were received. Additional acceptable gifts were presented by Messrs. W. F. Clapp, W. A. Hilton, R. T. Jackson, A. G. Mayer, and D. Thaanum.

The preparation of an extensive report on the echinoderms of South Africa occupied a considerable part of the year. A report on the holothurians collected during Mr. Agassiz's expeditions in the Tropical Pacific, on the Albatross in 1899–1900 and 1904–1905, was also completed, and a similar report on the sea-stars of the same expeditions was partially prepared.

REPORT ON THE COELENTERATES.

By Henry B. Bigelow.

The most important accessions to the collection received during the year are a series of the fresh-water Medusa *Craspedacusta sowerbii* Lankester, from Benson Creek, Kentucky, the gift of Dr. Harrison Garman; a series of ctenophores and hydroids from the coasts of New England, from the late Rev. H. W. Winkley; ctenophores from Massachusetts Bay from Dr. Thomas Barbour; a series of Renilla, from Beaufort, N. C., from Dr. G. H. Parker; of siphonophores and Medusae from Bermuda, from Dr. W. J. Crozier; and a considerable series of hydroids, Medusae, and ctenophores from the coast of Louisiana, presented by Mr. Percy Viasco.

My Museum work consists of the preparation of the report on the Grampus cruise of 1916, and of an account of the Medusae collected by the Canadian Arctic Expedition of 1913–1915, of which the Museum is to receive a representation.

REPORT ON INVERTEBRATE PALAEONTOLOGY.

By Percy E. Raymond.

The greater part of the year was devoted to the preparation and study of the fossils collected by the Shaler Memorial Expedition of 1917. This collection contains many species new to science, and a manuscript has been prepared in which a large number of the new species of trilobites are described. A part of the illustrations for this work have been drawn. Prof. Charles Schuchert sent for determination and description the Ordovician trilobites collected by Professor Twenhofel and himself in Newfoundland and the Mingan Islands some years ago, and this large collection served well to supplement the information derived from the Museum collections from Virginia.

Besides this work, the Curator was able to spend some time on the main collection of trilobites, identifying and labeling the Cyclopygidae and the species of some other genera belonging to various families. He also determined three collections submitted by the Geological Survey of Canada, and a few small lots for private individuals. Sixty drawers of fossils received from the Boston Society of Natural History were unpacked, sorted, and distributed, largely to the stratigraphic collection.

The Curator spent three weeks in June in collecting from the Ordovician and Devonian strata of Iowa. A small but interesting collection was obtained from the Maquoketa and Galena at Dubuque, and a larger quantity of material from the Maquoketa in the vicinity of Clermont, while one day was spent in picking up the beautifully preserved Upper Devonian brachiopods on Lime Creek. During the greater part of the trip Mr. J. H. Bradley, Jr., of Dubuque, assisted, and his efforts contributed many fine specimens. The Museum is also very grateful to Mr. A. G. Becker of Clermont, whose guidance made the collecting in the Maquoketa possible, and whose donations greatly enriched the results.

Prof. W. H. Twenhofel has returned to the Museum the Upper Ordovician and Silurian fossils, collected mainly by himself during

the Shaler Memorial Expedition to the Baltic in 1914. These are all carefully identified and labeled and the Museum is much indebted to Professor Twenhofel for his labor on them.

Dr. Carl Dunbar spent a week at the Museum in March, studying the Ordovician fossils collected in 1885 in Newfoundland by Prof. Alpheus Hyatt, and Mr. C. C. Stockman spent several weeks in an investigation involving the use of our large collection of *Leptaena rhomboidalis* and allied species.

In addition to the accessions alluded to above, the Museum has received by donation, three drawers of corals and Mollusca from the Fiji Islands, from Prof. W. G. Foye, and three brachiopods from Dr. R. S. Bassler. In exchange, three trilobites have been received from Prof. Charles Schuchert, and six blastoids from Mr. D. K. Greger. A few trilobites were collected by the Curator from the Middle Cambrian strata at Braintree, and one large specimen from the same locality was purchased.

REPORT ON THE GEOLOGICAL COLLECTION.

By Robert W. Sayles.

During the past year there have been few additions to the collections. From the Boston Society of Natural History we have received in exchange twenty-seven specimens illustrating dynamical and structural geology. No better exhibition specimens have ever come to the Museum. About thirty specimens illustrating seasonal deposition in glacial slate have been placed on exhibition. We are grateful to Professor Palache for a section of a fossil tree from Clover Creek, Idaho.

Most of the time during the fall and winter was spent in writing a memoir on Seasonal deposition in aqueo-glacial sediments.

The specimens in the collection are as follows:

Dynamical and Structural Geology, and Geography;

Specimens on exhibition	2155	
Specimens in trays, (reserve)	1460	3615
Models on exhibition	28	
Models in storage	14	
Wooden structural models	16	
Maps on exhibition	17	
Photographs on exhibition	280	
Transparencies	12	

Economic Geology;

Specimens on exhibition	1721	
Specimens in trays, (reserve).	514	2235
Total specimens		5850
Total specimens on exhibition		3876
Total specimens in storage		1974

REPORT ON THE LIBRARY.

During the Museum year from August 1, 1917, to July 31, 1918, inclusive, 757 volumes, 1,304 parts of volumes, and 3,309 pamphlets have been added to the Library.

The total number of volumes in the Library is 55,184, the total number of pamphlets is 55,808.

Three hundred and eighty-six volumes have been bound; two thousand and fifty pamphlets have been separately bound.

PUBLICATIONS

FOR THE YEAR 1917–1918

(1 AUGUST, 1917—31 JULY, 1918)

MUSEUM OF COMPARATIVE ZOÖLOGY.

BULLETIN: —

Vol. LV. Geological Series, Vol. IX.

No. 5. Harvard Seismographic Station. Seventh Annual Report including records, 1 January–31 December, 1915. By J. B. Woodworth. pp. 54. 1 plate. November, 1917.

Vol. LVII.

No. 5. The Gosibiidae of America north of Mexico. By Ralph V. Chamberlin. pp. 54. 6 plates. December, 1917.

Vol. LXI.

No. 9. New blastoids and brachiopods from the Rocky Mountains. By Thomas H. Clark. pp. 22. 2 plates. August, 1917.

No. 10. A new species of Peripatus from the mountains of Northern Peru. By Charles T. Brues. pp. 8. 1 plate. September, 1917.

No. 11. Birds from the Northern Coast of the Dominican Republic. By James L. Peters. pp. 38. October, 1917.

No. 12. Reports on the Scientific Results of the Expedition to the Tropical Pacific, 1899–1900. XVIII. Reports on the Scientific Results of the Expedition to the Eastern Tropical Pacific, 1904–1905. XXX. Ophiuroidea. By Hubert Lyman Clark. pp. 28. 5 plates. October, 1917.

No. 13. Jamaican ants collected by Prof. C. T. Brues. By William Morton Wheeler. pp. 18. 2 plates. December, 1917.

No. 14. Vertebrata from Madagascar. By George R. Agassiz, Thomas Barbour, Outram Bangs, and Glover M. Allen. pp. 44. 2 plates. February, 1918.

No. 15. The Harvard deep-sea thermograph. By Harry Clark. pp. 12. 5 plates. March, 1918.

Vol. LXII.

No. 1. New neuropteroid insects. By Nathan Banks. pp. 22. 2 plates. March, 1918.

No. 2. Notes on a collection of Surinam birds. By Outram Bangs and Thomas E. Penard. pp. 72. April, 1918.

No. 3. Parasitic Hymenoptera from the British Solomon Islands collected by Dr. W. M. Mann. By Charles T. Brues. pp. 36. 1 plate. May, 1918.

No. 4. Fossil mammals from Cuba. By Glover M. Allen. pp. 18. 1 plate. May, 1918.

No. 5. The Chilopoda and Diplopoda of the West Indies. By Ralph V. Chamberlin. pp. 114. July, 1918.

MEMOIRS: —

Vol. XLIII.

The American Characidae. By Carl H. Eigenmann. Pt. 1. pp. 102. 16 plates. August, 1917. Pt. 2. pp. 106. 22 plates. January, 1918.

REPORT: —

1916–1917. 39 pp. December, 1917.

ZOÖLOGICAL LABORATORY.

CONTRIBUTIONS: —

295. VAN HEUSEN, A. P.— The skin of the catfish (*Amiurus nebulosus*) as a receptive organ for light. *Amer. journ. physiol.*, September, 1917, **44**, p. 212–214.

296. PARKER, G. H. AND VAN HEUSEN, A. P.— The responses of the catfish, *Amiurus nebulosus*, to metallic and non-metallic rods. *Amer. journ. physiol.*, October, 1917, **44**, p. 405–420.

297. PARKER, G. H.— The pedal locomotion of the sea-hare *Aplysia californica*. *Journ. exper. zool.*, October, 1917, **24**, p. 139–145.

298. PARKER, G. H. AND VAN HEUSEN, A. P.— The reception of mechanical stimuli by the skin, lateral-line organs and ears in fishes, especially in Amiurus. *Amer. journ. physiol.*, November, 1917, **44**, p. 463–489.

299. PARKER, G. H.— The power of suction in the sea-anemone Cribrina. *Journ. exper. zoöl.*, November, 1917, **24**, p. 219–222.

300. PARKER, G. H.— The activities of Corymorpha. *Journ. exper. zoöl.*, November, 1917, **24**, p. 303–331.

301. STRINGER, C. E.— The means of locomotion in planarians. *Proc. Nat. acad. sci.*, December, 1917, **3**, p. 691–692.

302. OLMSTED, J. M. D.— The regeneration of triangular pieces of *Planaria maculata*. A study in polarity. *Journ. exper. zoöl.*, February, 1918, **25**, p. 157–176.

303, 304. HECHT, S.— The physiology of *Ascidia atra* Lesueur. I. General physiology. II. Sensory physiology. *Journ. exper. zoöl.*, February, 1918, **25**, p. 229–299.

305. HECHT, S.— The physiology of *Ascidia atra* Lesueur. III. The blood system. *Amer. journ. physiol.*, February, 1918, **45**, p. 157–187.

306. BRAY, A. W. L.— The reactions of the melanophores of Amiurus to light and adrenalin. *Proc. Nat. acad. sci.*, March, 1918, **4**, p. 58–60.

307. Walton, A. C.— The oögenesis and early embryology of *Ascaris canis* Werner. *Journ. morph.*, March, 1918, **30**, p. 527–603.

308. Olmsted, J. M. D.— Experiments on the nature of the sense of smell in the common catfish, *Amiurus nebulosus* (Lesueur). *Amer. journ. physiol.*, July, 1918, **46**, p. 443–458.

309. Redfield, A. C.— The physiology of the melanophores of the horned toad, Phrynosoma. *Journ. exper. zoöl.*, July, 1918, **26**, p. 275–333.

Bermuda Biological Station for Research.

Contributions: —

69. Collins, F. S. and Hervey, A. B.— The Algae of Bermuda. *Proc. Amer. acad. arts & sci.*, August, 1917, **53**, p. 1–195, pl. 1–6.

70. Crozier, W. J.— Evidence of assortive mating in a nudibranch. *Proc. Nat. acad. sci.*, August, 1917, **3**, p. 519–522.

71. Jordan, H.— Integumentary photosensitivity in a marine fish, *Epinephelus striatus* Bloch. *Amer. journ. physiol.*, October, 1917, **44**, p. 259–274.

72. Crozier, W. J.— The photic sensitivity of Balanoglossus. *Journ. exper. zoöl.*, November, 1917, **24**, p. 211–217.

73. Olmsted, J. M. D.— Notes on the locomotion of certain Bermudian mollusks. *Journ. exper. zoöl.*, November, 1917, **24**, p. 223–236.

74. Olmsted, J. M. D.— The comparative physiology of *Synaptula hydriformis* (Lesueur). *Journ. exper. zoöl.*, November, 1917, **24**, p. 333–379.

75. Crozier, W. J.— Fusion of "rhinophores" in Chromodoris. *Amer. nat.*, December, 1917, **51**, p. 756–758.

76. Crozier, W. J.— Note on the habitat of *Geonemertes agricola*. *Amer. nat.*, December, 1917, **51**, p. 758–760.

77. Crozier, B. B.— Bermudian species of Donatia (Tethya). *Ann. mag. nat. hist.*, January, 1918, ser. 9, **1**, p. 11–18.

78, 79. Hecht, S.— See *supra, Contrib. Zoöl. Lab.*, **303**, **304**.

80. Hecht, S.— See *supra, Contrib. Zoöl. Lab.*, **305**.

81. Crozier, W. J.— On sensory activation by alkalies. *Amer. journ. physiol.*, March, 1918, **45**, p. 315–322.

82. Crozier, W. J.— Sensory activation by acids. I. *Amer. journ. physiol.*, March, 1918, **45**, p. 323–341.

83. Crozier, W. J.— Cell penetration by acids. IV. Note on the penetration of phosphoric acid. *Journ. biol. chem.*, March, 1918, **33**, p. 463–470.

84. Crozier, W. J.— Note on the coloration of *Planes minutus*. *Amer. nat.*, April–May, 1918, **52**, p. 262–263.

85. Crozier, W. J.— A land planarian found at Bermuda. *Amer. nat.*, April–May, 1918, **52**, p. 616–617.

Allen, G. M.

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Reports on the Scientific Results of the Expedition to the Tropical Pacific, in charge of ALEXANDER AGASSIZ, on the U. S. Fish Commission Steamer "Albatross," from August, 1899, to March, 1900, Commander Jefferson F. Moser, U. S. N., commanding, as follows:—

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PUBLICATIONS

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Reports on the Results of Dredging Operations from 1877 to 1880, in charge of Alexander Agassiz, by the U. S. Coast Survey Steamer "Blake," Lieut. Commander C. D. Sigsbee, U. S. N., and Commander J. R. Bartlett, U. S. N., commanding.

Reports on the Results of the Expedition of 1891 of the U. S. Fish Commission Steamer "Albatross," Lieut. Commander Z. L. Tanner, U. S. N., commanding, in charge of Alexander Agassiz.

Reports on the Scientific Results of the Expedition to the Tropical Pacific, in charge of Alexander Agassiz, on the U. S. Fish Commission Steamer "Albatross," from August, 1899, to March, 1900, Commander Jefferson F. Moser, U. S. N., commanding.

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